Mann-Whitney U Practice Data for IA

Experimental Aim: To test whether drinking caffeine 30 minutes before a test will produce higher scores

H1: Drinking caffeine 30 minutes before a test will produce higher test scores

H0: Drinking caffeine 30 minutes before a test will not produce higher test scores

Procedure – Experimental: drink a can of Mountain Dew and then take a math test. Control just take the same test as the experimental group

Test score is out of 30

Experimental Group Results

Subject:

1. 22
2. 20
3. 29
4. 20
5. 14
6. 15
7. 19
8. 22
9. 24
10. 25

Control Group Results

Subject:

1. 25
2. 25
3. 27
4. 27
5. 26
6. 22
7. 22
8. 29
9. 19
10. 23
11. 25

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Experimental** | | | **Control** | | |
| **Subject** | **Result** | **Rank** | **Subject** | **Result** | **Rank** |
| **A** | 22 | 8.5 | **K** | 25 | 14.5 |
| **B** | 20 | 5.5 | **L** | 25 | 14.5 |
| **C** | 29 | 20.5 | **M** | 27 | 18.5 |
| **D** | 20 | 5.5 | **N** | 27 | 18.5 |
| **E** | 14 | 1 | **O** | 26 | 17 |
| **F** | 15 | 2 | **P** | 22 | 8.5 |
| **G** | 19 | 3.5 | **Q** | 22 | 8.5 |
| **H** | 22 | 8.5 | **R** | 29 | 20.5 |
| **I** | 24 | 12 | **S** | 19 | 3.5 |
| **j** | 25 | 14.5 | **T** | 23 | 11 |
|  |  |  | **U** | 25 | 14.5 |

Add Ranks for Experimental (T1)

T1 = 81.5

Add Ranks for Control (T2)

T2 = 149.5

Select the Larger of T1 and T2

Find n1, n2, nx – number of people in each group and the number of the people in the group with the larger T total

n1 = 10

n2 = 11

nX = 11

Find U

U = n1xn2+nXx (nX+1)/2 – Tx

U = 10x11+11x (11+1)/2 – 149.5

U = 110 + 66 – 149.5

U = 26.5

Wilcoxon Signed-Ranks Practice Data for IA

Experimental Aim: To test whether drinking caffeine 30 minutes before a test will produce higher scores

H1: Drinking caffeine 30 minutes before a test will produce higher test scores

H0: Drinking caffeine 30 minutes before a test will not produce higher test scores

Procedure – 10 subjects drink a can of Mountain Dew and then take a math test. They come back the next day and take a different test of the same difficulty without having had any caffeine

Test score is out of 30

Experimental Group Results

Subject:

1. 22
2. 20
3. 29
4. 20
5. 14
6. 15
7. 19
8. 22
9. 24
10. 25

Control Group Results

Subject:

1. 25
2. 25
3. 27
4. 27
5. 26
6. 22
7. 22
8. 29
9. 19
10. 25

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **Subject** | **Xa** | **Xb** | **Original**  **Xa-Xb** | **Absolute**  **Xa-Xb** | **Rank of absolute**  **Xa-Xb** | **Signed Rank** |
| **A** | 22 | 25 | -3 | 3 | 2.5 | -2.5 |
| **B** | 20 | 25 | -5 | 5 | 4.5 | -4.5 |
| **C** | 29 | 27 | 2 | 2 | 1 | +1 |
| **D** | 20 | 27 | -7 | 7 | 7 | -7 |
| **E** | 14 | 26 | -8 | 8 | 9 | -9 |
| **F** | 15 | 22 | -7 | 7 | 7 | -7 |
| **G** | 19 | 22 | -3 | 3 | 2.5 | -2.5 |
| **H** | 22 | 29 | -7 | 7 | 7 | -7 |
| **I** | 24 | 19 | 5 | 5 | 4.5 | +4.5 |
| **J** | 25 | 25 | 0 | 0 | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  |  |  | **W =** | **-34** |
|  |  |  |  |  | **N =** | **9** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **sum** | = | N(N+1)  2 |  | |  | |
|  |  |  |  |  | |  | |
|  |  | = | 9(9+1)  2 | = | | 45 | |
|  |  |  | | |  | |  | |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | -http://vassarstats.net/textbook/sigma.gif**W** = **sqrt** | [ | N(N+1)(2N+1)  6 | ] |

which for the present example, with N=14, works out as

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | -http://vassarstats.net/textbook/sigma.gif**W** = **sqrt** | [ | 9(9+1)(18+1)  6 | ] | = ±16.88 |

|  |  |  |
| --- | --- | --- |
| **z** | = | (**W**—http://vassarstats.net/textbook/mu.gif**W**)±.5  http://vassarstats.net/textbook/sigma.gif**W** |

|  |  |  |
| --- | --- | --- |
| **z** | = | **W**—.5  http://vassarstats.net/textbook/sigma.gif**W** |

|  |  |  |  |
| --- | --- | --- | --- |
| **z** | = | -34 —.5  16.88 | = -2.04 |

  -http://vassarstats.net/textbook/mu.gif**W** = 0